US EPA ARCHIVE DOCUMENT

TABLE 3.1 SWRCB's GEOLOGIC AND SITING CRITERIA FOR CLASSIFIED UNITS

Site Characteristics	[Reserved][1, 4]	Unit Classification: New Class II[2]	Reclassification of Existing Class II	New Class III[3]	Reclassification of existing Class II-2[3]
Geologic Setting		Substantial isolation from ground water; see §20250(b)	As for new Class II.	Adequate separation from ground water; characteristics other than hydraulic conductivity will be considered; see §20260(b).	As for new Class III.
Flooding		<<----------	No Siting Restriction[5]	---------->>	---------->>
Ground Rupture		200' setback from known Holocene fault.	Exempt[5], except that expansions are as for new Class II.	Not located on known Holocene fault.	Exempt[5], except that expansion as new Class III.
Rapid Geologic Change		<<----------	No Siting Restriction[5]	---------->>	---------->>
Tidal Waves[6]		<<---------- No siting restriction ---------->>			

1 [Reserved.] *Note: These standards removed because they apply only to Class I Units (see Chapter 15, Div. 3, Title 23, CCR).*

2 This category is defined in §20250(a).

3 This category is defined in §20260(a).

4 [Reserved.] *Note: Left in Ch-15. Applies only to Class I Units.*

5 Exemption from siting criteria does not release dischargers from the obligation to protect Units from the geologic or environmental hazards involved. Exemption is conditions on such protection.

6 The term "Tidal Waves" includes tsunamis, seiches, and surge condition.

§ 20270. CIWMB—Location Restrictions: Airport Safety. (T14:§17258.10)

(a) Owners or operators of new Municipal Solid Waste Landfill units (MSWLF), existing MSWLF units, and lateral expansions of MSWLF units that are located within 10,000 feet (3,048 meters) of any airport runway end used by turbojet aircraft or within 5,000 feet (1,524 meters) of any airport runway end used by only piston-type aircraft must demonstrate that the units are designed and operated so that the MSWLF unit does not pose a bird hazard to aircraft.

(b) Owners or operators proposing to site new MSWLF units and lateral expansions located within a five-mile radius of any airport runway end used by turbojet or piston-type aircraft must notify the affected airport and the Federal Aviation Administration (FAA).

(c) The owner or operator must place the demonstration made pursuant to paragraph (a) of this section in the operating record and notify the EA that it has been placed in the operating record.

(d) Existing MSWLF units that cannot make the demonstration specified in §20270(a) pertaining to airports must:

(1) close by October 9, 1996, in accordance with §21110 of this article;

(2) conduct postclosure activities in accordance with §21110 of this article; and

(3) conduct closure and postclosure activities in accordance with applicable sections of Chapter 4, and Chapter 6, of this Division.

(e) The deadline for closure required by paragraph (a) of this section may be extended up to two years if the owner or operator demonstrates to the CIWMB that:

(1) There is no available alternative disposal capacity; and

(2) There is no immediate threat to human health and the environment.

NOTE: Authority cited: Sections 40502, 43020 and 43021, Public Resources Code. Reference: Sections 40508 and 43103, Public Resources Code; and Title 40, Code of Federal Regulations, Sections 258.10 and 258.16.

HISTORY

1. New section filed 6-18-97; operative 7-18-97 (Register 97, No. 25).

Article 4. SWRCB—Waste Management Unit Construction Standards

§ 20310. SWRCB—General Construction Criteria. (C15: §2540)

(a) Class II waste management units (Class II "Units") shall be designed and constructed to prevent migration of wastes from the Units to adjacent geologic materials, ground water, or surface water, during disposal operations, closure, and the post-closure maintenance period. Class II and Class III MSW landfills are also subject to any applicable waste containment system design requirements of SWRCB Resolution No. 93-62 to the extent that such requirements are more stringent than those applicable to a non-MSW Class II or Class III landfill under this subdivision.

(b) Each Class II Unit shall be designed and constructed for the containment of the specific wastes which will be discharged.

(c) Class III landfills shall have containment structures which are capable of preventing degradation of waters of the state as a result of waste discharges to the landfills if site characteristics are inadequate.

(d) For the purposes of this paragraph, the words "new" and "existing" have the same meaning as described in §20080(d). New landfills, waste piles, and surface impoundments shall comply with the requirements of this article. Existing waste piles and surface impoundments shall be fitted with liners and leachate collection and removal systems as described in §20330 and §20340 as feasible. Existing landfills and waste piles shall have interim cover as described in §20705. Existing landfills, waste piles, and surface impoundments shall be fitted with subsurface barriers as described in §20360 as needed and feasible, and shall have precipitation and drainage control facilities as described in §20365. Existing surface impoundments shall comply with §20375. New and existing land treatment units shall comply with §20377. All existing Units shall comply with the seismic design criteria in Section 20370.

(e) Containment structures shall be designed by, and construction shall be supervised and certified by, a registered civil engineer or a certified engineering geologist. Units shall receive a final inspection and approval of the construction by RWQCB or SWRCB staff before use of the Unit commences.

(f) The discharger shall maintain the integrity of containment structures in spite of normal excavation or fire control work; nevertheless, for fire control work, the discharger can damage containment structures to the extent necessary to control the fire, so long as the discharger promptly repairs such damage after extinguishing the fire. Excavations made as part of discharge operations shall not result in removal of any portion of a containment structure.

(g) Stability Analysis—For any portions of the Unit's containment system installed after July 18, 1997 for which the RWQCB has not approved a slope and foundation stability report on or before that date, the discharger shall meet the requirements of §21750(f)(5).

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13360, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New article 4 (sections 20310-20377) and section filed 6-18-97; operative 7-18-97 (Register 97, No. 25).

§ 20320. SWRCB—General Criteria for Containment Structures. (C15: §2541)

(a) Material Properties—Materials used in containment structures shall have appropriate chemical and physical properties to ensure that such structures do not fail to contain waste because of pressure gradients (including hydraulic head and external hydrogeologic forces), physical contact with the waste or leachate, chemical reactions with soil and rock, climatic conditions, the stress of installation, or because of the stress of daily operation.

(b) Applicable Permeants—Hydraulic conductivities specified for containment structures other than cover shall be relative to the fluids, including waste and leachate, to be contained. Hydraulic conductivities specified for final cover shall be relative to water.

(c) Determining Hydraulic Conductivity—Hydraulic conductivities shall be determined primarily by appropriate field test methods in accordance with accepted civil engineering practice. The results of laboratory tests with both water and leachate, and field tests with water (*e.g., on the test pad*), shall be compared to evaluate how the field permeabilities will be affected by leachate. It is acceptable for the discharger to use appropriate compaction tests in conjunction with laboratory hydraulic conductivity tests to determine field permeabilities as long as a reasonable number of field hydraulic conductivity tests are also conducted (*e.g., a sealed double-ring infiltrometer test on the test pad*).

(d) Soils Used in Containment Structures—Earthen materials used in containment structures other than cutoff walls and grout curtains shall consist of a mixture of clay and other suitable fine-grained soils which have the following characteristics, and which, in combination, can be compacted to attain the required hydraulic conductivity when installed. Liners made of such materials are referred to as "clay liners" in this subchapter.

(1) At least 30 percent of the material, by weight, shall pass a No. 200 U.S. Standard sieve.

(2) The materials shall be fine-grained soils with a significant clay content and without organic matter, and which is a clayey sand, clay, sandy or silty clay, or sandy clay under a soil classification system having industry-wide use [*e.g., the "SC", "CL", or "CH" soil classes under ASTM Designation: "2487-93 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)*].

(e) Synopses—Construction standards for waste management units other than land treatment are given on Table 4.1 and in Figure 4.1.

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13360, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New section, Table 4.1 and Figure 4.1 filed 6–18–97; operative 7–18–97 (Register 97, No. 25).
2. Change without regulatory effect amending Table 4.1 filed 3–17–98 pursuant to section 100, title 1, California Code of Regulations (Register 98, No. 12).

Table 4.1. Construction Standards for Units[1]

Waste Mgmt Unit Classification	*Type of Waste Management Unit*	*Clay Liner*[2]	*Synthetic Liner*	*Leachate Collection and Rem. System*	*Interim Cover*	*Subsurface Barriers* *Cutoff Walls*	*Subsurface Barriers* *Grout Curtains*	*Capacity of Precip & Drain. Control Facilities (Design Storm)*	*Seismic Design*
Class II	Non MSW Landfill	Required[3], $\leq 1x10^{-6}$cm/sec	not required	required, blanket type	required	$\leq 1x10^{-6}$ cm/sec[11]	$\leq 1x10^{-6}$ cm/sec	1000–year 24–hour precipitation	Withstand maximum credible earthquake
	MSW Landfill[13]	special[13] $\leq 1x10^{-6}$cm/sec	special[13]	special[13] blanket type	required	$\leq 1x10^{-6}$ cm/sec[11]	$\leq 1x10^{-6}$ cm/sec	1000–year 24–hour precipitation	Withstand maximum credible earthquake
	Surface Impoundment	double or single required[6], $\leq 1x10^{-6}$ cm/sec	not required	required with double liner, blanket type		$\leq 1x10^{-6}$ cm/sec	$\leq 1x10^{-6}$ cm/sec		
	Waste Pile	options[4,5], $\leq 1x10^{-6}$ cm/sec	not required	may be required, blanket type		$\leq 1x10^{-6}$ cm/sec[11]	$\leq 1x10^{-6}$ cm/sec		
Class III	Non MSW Landfill	optional, $\leq 1x10^{-6}$cm/sec (see §20260)	not required	required if liner is required, blanket or dendritic	required	$\leq 1x10^{-6}$ cm/sec, if required	$\leq 1x10^{-6}$ cm/sec, if required	100–year 24–hour precipitation	Withstand at least the maximum probable earthquake (See §20370)
	MSW Landfill[13]	special[13]	special[13]	special[13]	required	$\leq 1x10^{-6}$ cm/sec, if required	$\leq 1x10^{-6}$ cm/sec, if required	100–year 24–hour precipitation	Withstand at least the maximum credible earthquake (See §20370)

[1]Applicable regulations in this article may provide for exemptions to certain requirements. §20310(d) describes applicability to existing facilities.

[2]All permeabilities specified in this table are maximum allowable permeabilities.

[3][Reserved.] *Note: This footnote left in Ch–15 (of Division 3, Title 23, CCR), as it applies only to Class I Units.*

[4]A synthetic liner alone may be allowed based on nature of waste to be contained and duration of the operation. A waste pile with a synthetic liner alone may not be closed as a landfill pursuant to §21410 of this subchapter. The synthetic liner hydraulic conductivity shall be the same or less than that which would be required for a clay liner.

[5]Clay liner required unless Units are underlain by a substantial thickness of natural geologic materials with hydraulic conductivity of $1x10^{-6}$ cm/sec [i.e., 1 foot/year] or less.

[6]Single liner shall be a clay liner and removed or replaced as described in §20330. Double liner systems shall have either an outer clay liner or shall be underlain by a substantial thickness of natural geologic materials with an hydraulic conductivity of $1x10^{-6}$ cm/sec [i.e., 1 foot/year] or less to act as an outer liner.

[7][Reserved.]

[8][Reserved.]

[9][Reserved.]

[10][Reserved.]

[11]Cutoff walls required where there is potential for lateral movement of fluid, including waste or leachate, and the hydraulic conductivity of natural geologic materials is used for waste containment.

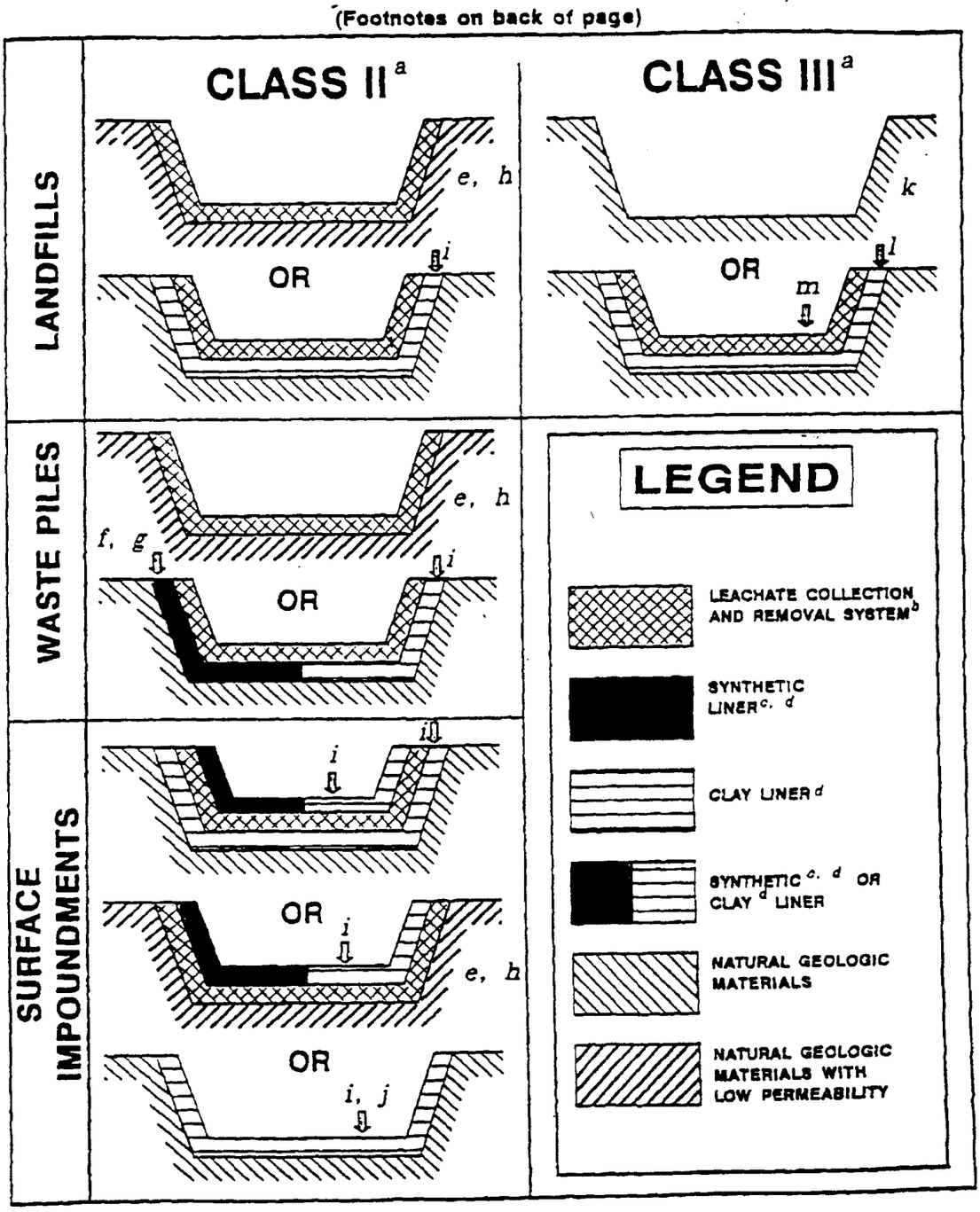
[12]For Units other than MSW landfills, the RWQCB can grant an exemption to this design storm requirement if the discharger can demonstrate that the integrity of facilities will not be jeopardized if this criterion is not met.

[13]All Class II or Class III landfills that received MSW at any time and that received solid waste after October 9, 1991 (MSW landfills) are subject to the additional state and federal requirements contained (or incorporated by reference) in SWRCB Resolution No. 93–62.

Figure 4.1:

SUMMARY OF LINER REQUIREMENTS FOR CLASSIFIED WASTE MANAGEMENT UNITS

(Footnotes on back of page)



Footnotes for Figure 4.1: Summary of Liner Requirements for Classified Units (for MSW Landfills, see Additional Requirements in SWRCB Resolution No. 93–92).

[a] Requirements from Chapter 3, Subdivision 1 of this division.

[b] Designed to convey twice the anticipated volume of leachate; must ensure no buildup of hydraulic head on liner; blanket type required unless otherwise specified.

[c] Minimum 40 mils thick.

[d] Must be compatible with waste and/or leachate.

[c] Cutoff walls required where potential exists for lateral movement of waste or leachate.

[f] Acceptability of synthetic liner depends on nature of waste and duration of operation.

[g] Liner and waste to be removed at closure.

[h] Substantial thickness of natural geologic material with maximum hydraulic conductivity of 1×10^{-6} cm/sec (i.e., 1.0 foot/year). For MSW landfills, see SWRCB Resolution No. 93–62 for superseding containment system requirements.

[i] Minimum thickness of 2 feet; maximum hydraulic conductivity of 1×10^{-6} cm/sec (i.e., 1.0 foot/year). For MSW landfills, see SWRCB Resolution No. 93–62 for superseding containment system requirements.

[j] Liner removed or replaced before lower 25% (minimum 1 foot thickness) of the liner is penetrated by waste or leachate.

[k] Soil characteristics, distance from waste to ground water, and other factors must ensure no impairment of beneficial uses of ground water. Leachate collection system required for sludge disposal. For MSW landfills, see SWRCB Resolution No. 93–62 for superseding containment system requirements.

[l] Minimum thickness of 1 foot; maximum hydraulic conductivity of 1×10^{-6} cm/sec (i.e., 1.0 foot/year). For MSW landfills, see SWRCB Resolution No. 93–62 for superseding containment system requirements.

[m] Dendritic system allowed if wastes in contact with the liner will remain permeable and liner is sloped toward the system to prevent ponding. For MSW landfills, see SWRCB Resolution No. 93–62 for superseding containment system requirements.

§ 20323. SWRCB — CQA Plan. (new)

After July 18, 1997, the RWQCB shall require construction for all liner systems and final cover systems to be carried out in accordance with a CQA plan certified by an appropriately registered professional to satisfy the requirements of §20324. If the RWQCB finds that any construction of the liner system or final cover system was undertaken in the absence of a CQA plan that satisfies the requirements of §20324, the RWQCB shall require the discharger to undertake any corrective construction needed to achieve such compliance.

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13360, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New section filed 6–18–97; operative 7–18–97 (Register 97, No. 25).

§ 20324. SWRCB — CQA Requirements. (T14: §17774)

(a) Performance Standard—The construction quality assurance (CQA) program, including all relevant aspects of construction quality control (CQC), shall provide evidence that materials and procedures utilized in the placement of the any containment feature at a waste management unit (Unit) will be tested and monitored to assure the structure is constructed in accordance with the design specifications approved by the RWQCB.

(b) Professional Qualifications.

(1) The design professional who prepares the CQA plan shall be a registered civil engineer or certified engineering geologist; and

(2) The construction quality assurance program shall be supervised by a registered civil engineer or certified engineering geologist who shall be designated the CQA officer.

(c) Reports.

(1) The project's CQA report shall address the construction requirements, including any vegetation procedures, set forth in the design plan for the containment system. For each specified phase of construction, this report shall include, but not be limited to:

(A) a delineation of the CQA management organization, including the chain of command of the CQA inspectors and contractors;

(B) a detailed description of the level of experience and training for the contractor, the work crew, and CQA inspectors for every major phase of construction in order to ensure that the installation methods and procedures required in the containment system design will be properly implemented.

(C) a description of the CQA testing protocols for preconstruction, construction, and postconstruction which shall include at a minimum:

1. the frequency of inspections by the operator,

2. the sampling and field testing procedures and equipment to be utilized, and the calibration of field testing equipment,

3. the frequency of performance audits determined by the design professional and examined by the CQA officer,

4. the size, method, location and frequency of sampling, sampling procedures for laboratory testing, the soils or geotechnical laboratory to be used, the laboratory procedures to be utilized, the calibration of laboratory equipment and quality assurance and quality control of laboratory procedures,

5. the pass/fail criteria for sampling and testing methods used to achieve containment system design, and

6. a description of the corrective procedures in the event of test failure.

(d) Documentation—Construction quality assurance documentation requirements shall include, at the minimum: reports bearing unique identifying sheet numbers for cross–referencing and document control, the date, project name, location, descriptive remarks, the data sheets, inspection activities, and signature of the designated authorities with concurrence of the CQA officer.

(1) The documentation shall include:

(A) Daily Summary Reports—daily recordkeeping, which shall include preparation of a summary report with supporting inspection data sheets, problem identification and corrective measures reports. Daily summary reports shall provide a chronological framework for identifying and recording all other reports. Inspection data sheets shall contain all observations (i.e., notes, charts, sketches, or photographs), and a record of field and/or laboratory tests. Problem identification and corrective measures reports shall include detailed descriptions of materials and/or workmanship that do not meet a specified design and shall be cross–referenced to specific inspection data sheets where the problem was identified and corrected;

(B) Acceptance Reports—all reports shall be assembled and summarized into Acceptance Reports in order to verify that the materials and construction processes comply with the specified design. This report shall include, at a minimum, inspection summary reports, inspection data sheets, problem identification and corrective measures reports;

(C) Final Documentation—at the completion of the project, the operator shall prepare a Final Documentation which contains all reports submitted concerning the placement of the containment system. This document shall provide evidence that the CQA plan was implemented as proposed and that the construction proceeded in accordance with design criteria, plans, and specifications. The discharger shall submit copies of the Final Documentation report to the RWQCB as prepared by the CQA officer.

(2) Once construction is complete, the document originals shall be stored by the discharger in a manner that will allow for easy access while still protecting them from any damage. All documentation shall be maintained throughout the postclosure maintenance period.

(e) Laboratory Testing Requirements. [*Note: the following (ASTM) standards are available from the American Society of Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428–2929, phone: 610–832–9585*]

(1) Analysis of earthen materials shall be performed prior to their incorporation into any containment system component. Representative samples for each layer within the containment system shall be evaluated. The following minimum laboratory testing procedures shall be performed:

(A) ASTM Designation: D 1557–91 [1/91], "Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN–m/m3)" which is incorporated by reference;

(B) ASTM Designation: D 422–63 (Reapproved) [9/90], "Standard Method for Particle–Size Analysis of Soils," which is incorporated by reference: and

(C) ASTM Designation: D 2487–93 [11/93], "Standard Classification of Soils for Engineering Purposes," which is incorporated by reference.

(2) In addition to the tests listed in ¶(e and f), the following minimum laboratory tests shall be performed on low–hydraulic–conductivity layer components constructed from soil:

(A) ASTM Designation: D 4318–93 [11/93], "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils," which is incorporated by reference; and

(B) United States Environmental Protection Agency (USEPA) Test Method 9100 [Approved 9–86], "Triaxial–Cell Method with Back Pressure," which is incorporated by reference.

(f) Field Testing Requirements—The following minimum field test procedure shall be performed for each layer in the containment system: ASTM Designation: D 2488–93 [9/93], Standard Practice for Description and Identification of Soils (Visual–Manual Procedure), which is incorporated by reference.

(g) Test Fill Pad Requirements—Before installing the compacted soil barrier layer component of a final cover system, or the compacted soil component of a liner system, the operator shall accurately establish the correlation between the design hydraulic conductivity and the density at which that conductivity is achieved. To accomplish this the operator shall:

(1) provide a representative area for a test on any compacted foundation and low–hydraulic– conductivity layers. The following minimum testing procedures shall be performed:

(A) the test pad foundation and, for final covers, the barrier layers shall be compacted with the designated equipment to determine if the specified density/moisture–content/hydraulic– conductivity relationships determined in the laboratory can be achieved in the field with the compaction equipment to be used and at the specified lift thickness;

(2) perform laboratory tests as specified in subsection (e); and

(3) perform field tests as specified in subsection (f). The discharger shall perform hydraulic conductivity tests in the test area under saturated conditions by using the standard test method ASTM Designation: D 3385–94 [9/94], "Standard Test Method for Infiltration Rate of Soils in Field Using Double–Ring Infiltrometer," which is incorporated by reference, for vertical hydraulic conductivity measurements. A sufficient number of tests shall be run to verify the results. Other methods that provide an accurate and precise method of measuring field hydraulic conductivity may be utilized as approved by the RWQCB.

(4) Correlations between laboratory tests and test pad results shall be established for each of the various types of fill materials and blends to be used in construction of the actual cover.

(h) Earthen Material Requirements.

(1) The following minimum tests shall include, but not be limited to:

(A) Laboratory tests as specified in ¶(e); and

(B) Field tests as specified in subsections (f and g).

(2) The following minimum testing frequencies shall be performed:

(A) Four (4) field density tests shall be performed for each 1,000 cubic yards of material placed, or at a minimum of four (4) tests per day;

(B) Compaction curve data (ASTM Designation: D 1557–91) graphically represented, and Atterberg limits (ASTM Designation: D 4318–93) shall be performed on the barrier layer material once a week and/or every 5,000 cubic yards of material placed;

(C) For field hydraulic conductivity tests, representative samples shall be performed on barrier layer material;

1. The frequency of testing may be increased or decreased, based on the pass/failure status of previous tests, as approved by the RWQCB.

2. Field infiltration tests shall be performed for the duration necessary to achieve steady conditions for the design hydraulic conductivity.

3. The following interpretive equation shall be used to determine the design hydraulic conductivity:

The infiltration rate (I) is defined as:

$$I = Q/(tA)$$

where Q = volume of flow;
t = interval of time corresponding to flow Q; and
A = area of the ring;

then the hydraulic conductivity (k) can be calculated from Darcy's law as follows:

$$k = I/i$$

where: I = infiltration rate; and
i = hydraulic gradient.

(i) Geosynthetic Membrane Requirements.

(1) Performance requirements for the geosynthetic membrane include, but are not limited to, the following:

(A) a need to limit infiltration of water, to the greatest extent possible;

(B) a need to control landfill gas emissions;

(C) for final covers, mechanical compatibility with stresses caused by equipment traffic, and the result of differential settlement of the waste over time; and

(D) for final covers, durability throughout the postclosure maintenance period.

(2) Minimum Criteria—The minimum construction quality assurance criteria to ensure that geosynthetic membranes will meet or exceed all design specifications shall include, but not be limited to:

(A) Preconstruction quality control program:

1. inspection of the raw materials (e.g., density, melt flow index, percent carbon Black);

2. manufacturing operations and finished product specifications (e.g., thickness, puncture resistance, multi–axial stress/strain tests),

3. fabrication operations (e.g., factory seaming);

4. observations related to transportation, handling, and storage of the geosynthetic membrane; and

5. inspection of foundation preparation;

(B) Construction activities:

1. the geosynthetic membrane shall have thickness strength sufficient to withstand the stresses to which it shall be subjected, including shear forces, puncture from rocks or, for final covers, penetration from roots.

2. inspection of geosynthetic membrane placement (e.g., trench corners, monitoring systems).

3. seaming of the material; and

4. installation of anchors and seals;

(C) Postconstruction Activity—postconstruction activity includes checking for material and placement imperfections in the installed geosynthetic membrane. Imperfections that jeopardize the integrity of the membrane's function as an impermeable barrier (i.e., pin holes, rips, creases created during placement) shall be repaired to the original manufacturer's specifications and reinspected by the CQA officer; and

(D) Evaluation—evaluation of the personnel and equipment to be used to install and inspect the geosynthetic membrane, and pass/fail criteria and corrective procedures for material and installation procedures shall be specified as required in ¶(c).

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13360, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New section filed 6–18–97; operative 7–18–97 (Register 97, No. 25).

§ 20330. SWRCB — Liners. (C15: §2542)

(a) Performance Standard—Liners shall be designed and constructed to contain the fluid, including landfill gas, waste, and leachate, as required by Article 3 of this subchapter (§20240 et seq., and §20310).

(b) Clay Liners—Clay liners for a Class II Unit shall be a minimum of 2 feet thick and shall be installed at a relative compaction of at least 90 percent. For a Class III landfill, a clay liner, if required, shall be a minimum of 1–foot thick and shall be installed at a relative compaction of at least 90 percent. For MSW landfills subject to the liner requirements in the federal MSW regulations of 40CFR258, after the Federal Deadline for liners at that Unit, the requirements of this paragraph are superseded

by those of SWRCB Resolution No. 93–62 for all portions of the Unit outside the Existing Footprint.

(c) FMLs—Flexible membrane liners ("FMLs", or synthetic liners) shall have a minimum thickness of 40 mils (i.e., 0.040"). For an MSW landfill subject to the liner requirements in the federal MSW regulations (40CFR258), after the Federal Deadline for liners at that Unit, the requirements of this paragraph are superseded by those of SWRCB Resolution No. 93–62 for all portions of the Unit outside the Existing Footprint.

(d) Lined Area—Liners shall be installed to cover all natural geologic materials (at the Unit) that are likely to be in contact with waste (including landfill gas or leachate).

(e) S.I. With Replaceable Liner—A Class II surface impoundment may have a single clay liner with a hydraulic conductivity of 1×10^{-6} cm/sec (i.e., 1 foot/year) or less if the liner is removed or replaced before the last 25 percent (minimum 1 foot thickness) of the liner is penetrated by fluid, including waste or leachate. The method used to determine seepage velocity shall be included with the calculations of liner penetration.

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13360, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New section filed 6–18–97; operative 7–18–97 (Register 97, No. 25).

§ 20340. SWRCB — Leachate Collection and Removal Systems (LCRS). [C15: §2543 // T14: §17781(b)(2) & (d)(1)]

(a) Basic LCRS Design—Leachate collection and removal systems (LCRS) are required for Class II landfills and surface impoundments, and for Class III landfills which have a liner or which accept sewage or water treatment sludge. The LCRS shall be installed directly above underlying containment features for landfills and waste piles, and installed between the liners for surface impoundments. LCRS requirements are summarized on Table 4.1. Class II landfills and waste piles which contain only dry wastes (not including nonhazardous solid waste and decomposable waste) may be allowed to operate without an LCRS if the discharger demonstrates, based on climatic and hydrogeologic conditions, that leachate will not be formed in, or migrate from, the Unit; nevertheless, for a Class II or Class III MSW landfill, after the Federal Deadline for installing liners at that Unit, the LCRS requirements of SWRCB Resolution No. 93–62 apply to all portions outside of the Unit's Existing Footprint.

(b) Placement—Except as otherwise provided in ¶(e or f), where an LCRS is used, it shall be installed immediately above the liner (except in the case of a surface impoundment), and between the inner and outer liner of a double-liner system, and shall be designed, constructed, maintained, and operated to collect and remove twice the maximum anticipated daily volume of leachate from the Unit.

(c) Head Buildup—The RWQCB shall specify design and operating conditions in WDRs to ensure that there is no buildup of hydraulic head on the liner. The depth of fluid in the collection sump shall be kept at the minimum needed to ensure efficient pump operation.

(d) Clogging—LCRSs shall be designed and operated to function without clogging through the scheduled closure of the Unit and during the post-closure maintenance period. The systems shall be tested at least annually to demonstrate proper operation. The results of the tests shall be compared with earlier tests made under comparable conditions.

(e) Standard LCRS—LCRSs shall consist of a permeable subdrain layer which covers the bottom of the Unit and extends as far up the sides as possible, (i.e., blanket-type) except as provided in ¶(f). The LCRS shall be of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying wastes, waste cover materials, and by any equipment used at the Unit.

(f) Alternative LCRS—Except as otherwise required for MSW landfills, under SWRCB Resolution No. 93–62, if a Class III landfill is required to have an artificial liner and receives only permeable waste that allows free drainage of percolating fluid, the RWQCB can allow the use of a dendritic LCRS which underlies less than 100 percent of the waste; in this type of LCRS system, only wastes which have an hydraulic conductivity which approximates that of subdrain material, and which will remain permeable throughout the active life and post-closure maintenance period of the landfill, shall be placed adjacent to the liner. Furthermore, to prevent ponding, when using this type of LCRS, all portions of the liner not overlain by a portion of the subdrain system shall be sloped towards the subdrain so that ponding is minimized and leachate is removed as quickly as possible from the base of the landfill.

(g) Leachate Handling—Except as otherwise provided under SWRCB Resolution No. 93–62 (for MSW landfills subject to 40CFR258.28), collected leachate shall be returned to the Unit(s) from which it came or discharged in another manner approved by the RWQCB. Collected leachate can be discharged to a different Unit only if:

(1) the receiving Unit has an LCRS, contains wastes which are similar in classification and characteristics to those in the Unit(s) from which leachate was extracted, and has at least the same classification (under Article 3 of this subchapter) as the Unit(s) from which leachate was extracted;

(2) the discharge to a different Unit is approved by the RWQCB;

(3) the discharge of leachate to a different Unit shall not exceed the moisture-holding capacity of the receiving unit, and shall comply with §20200(d).

(h) Leachate Production Rate—After July 18, 1997, for a landfill equipped with an LCRS, the discharger shall note, as a part of each regularly scheduled monitoring report [under Article 1, Subchapter 3, Chapter 3 of this division (§20380 et seq.)], the total volume of leachate collected each month since the previous monitoring report.

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13360, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New section filed 6–18–97; operative 7–18–97 (Register 97, No. 25).

§ 20360. SWRCB — Subsurface Barriers. (C15: §2545)

(a) Subsurface barriers are cutoff walls or grout curtains which are used in conjunction with natural geologic materials to assure that lateral hydraulic conductivity standards specified in Article 3 of this subchapter are satisfied. Paragraphs (b) and (c) specify conditions under which cutoff walls and grout curtains, respectively, are used.

(b) Cutoff walls.

(1) Cutoff walls are required at Class II Units where there is potential for lateral movement of fluid, including waste or leachate, and the hydraulic conductivity of natural geologic materials is used for waste containment in lieu of a liner. Cutoff walls shall be installed at Class III landfills as required by the RWQCB.

(2) Cutoff walls shall be:

(A) a minimum of two feet thick for clay materials; or

(B) a minimum of 40 mils (i.e., 0.040") thick for synthetic materials; and

(C) regardless of the option under ¶(b)(2)(A or B), shall be keyed a minimum of five feet into natural geologic material which satisfies the applicable hydraulic conductivity requirements in Article 3 of this subchapter.

(3) If cutoff walls are used, excavations for Units shall be keyed into natural geologic materials which satisfy applicable hydraulic conductivity requirements in Article 3 of this Subchapter.

(4) At closure of a waste pile or surface impoundment, all contaminated natural geologic materials present between the cutoff wall(s) and the waste shall be removed and disposed of at an authorized location, or the Unit shall be closed as a landfill.

(5) Cutoff walls shall have fluid collection systems installed upgradient of the structure. The systems shall be designed, constructed, operated, and maintained to prevent the buildup of hydraulic head against the structure. The collection system shall be inspected regularly, and accumulated fluid shall be removed.

(c) Grout Curtains.

(1) Grout curtains may be used as needed to prevent lateral waste movement through fractures in natural geologic materials that otherwise satisfy applicable hydraulic conductivity requirements in Article 3 of this

Subchapter. Only fractures that are at or near the surface and are of limited vertical extent may be grouted.

(2) The acceptability of grout curtains for a Unit shall include consideration of:

(A) depth and nature of fracturing; and

(B) fracture orientation.

(3) Grout characteristics shall not be adversely affected by fluid, including waste and leachate, or natural conditions.

(4) Optimum grouting pressure and the placement of grout holes shall be determined by test grouting.

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13360, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New section filed 6–18–97; operative 7–18–97 (Register 97, No. 25).

§ 20365. SWRCB — Precipitation and Drainage Controls. [C15: §2546 // T14: §17778(e), (f)(1), (g), & (j)]

(a) General—Units and their respective containment structures shall be designed and constructed to limit, to the greatest extent possible, ponding, infiltration, inundation, erosion, slope failure, washout, and overtopping under the precipitation conditions specified in Table 4.1 (of this article) for each class of waste management unit (Unit). [*Note: see also §21090(b)(1).*]

(b) Undiverted Precipitation—Precipitation on landfills or waste piles which is not diverted by covers or drainage control systems shall be collected and managed through the leachate collection and removal system, which shall be designed and constructed to accommodate precipitation conditions specified in Table 4.1 of this article or each class Unit.

(c) Performance Standards—Diversion and drainage facilities shall be designed, constructed, and maintained:

(1) to accommodate the anticipated volume of precipitation and peak flows from surface runoff under the precipitation conditions specified in Table 4.1 of this article for each class of Unit;

(2) to effectively divert sheet flow runoff laterally, or via the shortest distance, into the drainage and collection facilities;

(3) to prevent surface erosion through the judicious use of:

(A) energy dissipators where required to decrease the velocity of runoff; and

(B) slope protection and other erosion control measures;

(4) to control and intercept run–on, in order to isolate uncontaminated surface waters from water that might have come into contact with waste;

(5) to take into account:

(A) for closed Units and for closed portions of Units, the expected final contours of the closed Unit, including its planned drainage pattern;

(B) for operating portions of Units other than surface impoundments, the Unit's drainage pattern at any given time;

(C) the possible effects of the Unit's drainage pattern on and by the regional watershed;

(D) the design capacity of drainage systems of downstream and adjacent properties by providing for the gradual release of retained water downstream in a manner which does not exceed the expected peak flow rate at the point of discharge if there were no waste management facility; and

(6) to preserve the system's function. Therefore, the discharger shall periodically remove accumulated sediment from the sedimentation or detention basins as needed to preserve the design capacity of the system.

(d) Maintain Capacity—Collection and holding facilities associated with precipitation and drainage control systems shall be emptied immediately following each storm or otherwise managed to maintain the design capacity of the system.

(e) Divert Drainage—Surface and subsurface drainage from outside of a Unit shall be diverted from the Unit.

(f) Resist Erosion from Design Storm—Cover materials shall be graded to divert precipitation from the Unit, to prevent ponding of surface water over wastes, and to resist erosion as a result of precipitation with the return frequency specified in Table 4.1 (of this article) for each class of Unit, unless, for a landfill, the CIWMB/EA requires (for protection of public health and safety) that the design be capable of resisting erosion resulting from a longer return interval storm [see §21150(b)]. Any drainage layer in the final cover shall be designed and constructed to intersect with the final drainage system for the Unit in a manner promoting free drainage from all portions of the drainage layer.

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13360, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New section filed 6–18–97; operative 7–18–97 (Register 97, No. 25).

§ 20370. SWRCB — Seismic Design. (C15: §2547)

(a) Class II Units shall be designed to withstand the maximum credible earthquake (MCE) without damage to the foundation or to the structures which control leachate, surface drainage, or erosion, or gas. Class III Units shall be designed to withstand the maximum probable earthquake (MPE) without damage to the foundation or to the structures which control leachate, surface drainage, or erosion, or gas. [*Note: see also submittal requirements under §21750(f)(5).*]

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13360, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New section filed 6–18–97; operative 7–18–97 (Register 97, No. 25).

§ 20375. SWRCB — Special Requirements for Surface Impoundments. (C15: §2548)

(a) Freeboard—Surface impoundments shall have sufficient freeboard to accommodate seasonal precipitation and the design storm specified in Table 4.1 of this article, but in no case less than 2 feet (measured vertically, from the water surface up to the point on the surrounding lined berm, or dike, having the lowest elevation), and shall be designed and constructed to prevent overtopping as a result of wind conditions likely to accompany such precipitation conditions. The RWQCB can allow a freeboard of less than 2 feet at surface impoundments located on the interior portions of a waste management facility where: 1) these interiormost impoundments are designed such that potential overflows would be reliably conveyed by gravity flow and discharged to other surface impoundments having adequate capacity to receive such diversion without exceeding their respective freeboard limitations; 2) the operation implements a properly developed water balance plan; and 3) the facility is provided with a fail–safe emergency retention area solely for the purpose of containing wastes due to surface impoundment failures.

(b) Operation Plan—An operation plan shall be submitted to the RWQCB which will provide operation levels and waste input quantities permitted each month based on anticipated precipitation and on past precipitation conditions for the year.

(c) Fail–Safe—Direct pipeline discharge to surface impoundments shall be either equipped with devices or shall have fail–safe operating procedures to prevent overfilling. Discharges shall be stopped in the event of any containment system failure which causes a threat to water quality.

(d) Unauthorized Discharges—There shall be no discharge from a surface impoundment except as authorized by WDRs.

(e) Scour Protection—Surface impoundments shall be designed and constructed to prevent scouring of containment structures at points of discharge into the impoundments and by wave action at the waterline.

(f) Liner Inspections—All visible portions of synthetic liners shall be inspected weekly until all free liquid is removed from the surface impoundment as part of closure pursuant to §21400(a). If, during the active life of the impoundment, the wastes are removed and the bottom of the impoundment is cleaned down to the liner, an inspection shall be made of the bottom of the liner prior to refilling of the impoundment.

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13360, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New section filed 6–18–97; operative 7–18–97 (Register 97, No. 25).

§ 20377. SWRCB — Special Requirements for Land Treatment Units (LTUs). (C15: §2549)

(a) General—Dischargers operating LTUs shall comply with the general criteria specified in §20320(a & d), with the precipitation and drainage controls specified in §20365, and with the seismic design criteria in §20370.

(b) Performance Standard—Dischargers shall design, construct, operate, and maintain LTUs to maximize the degradation, transformation, and immobilization of waste constituents in the treatment zone. Dischargers shall design, construct, operate, and maintain units in accord with all design and operating conditions that were used in treatment demonstrations under §20250.

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13360, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New section filed 6–18–97; operative 7–18–97 (Register 97, No. 25).

Subchapter 3. Water Monitoring

[Note: For gas monitoring at landfills, see Article 6, Subchapter 4 of this chapter. For final cover monitoring at landfills, see §21090(a)(4).]

Article 1. SWRCB — Water Quality Monitoring and Response Programs for Solid Waste Management Units

§ 20380. SWRCB — Applicability. (C15: §2550.0)

(a) The regulations in this article apply to owners or operators of facilities that treat, store, or dispose of waste at waste management units. The owner or operator of a surface impoundment, waste pile, landfill, or land treatment unit that receives or has received waste (hereinafter referred to as "waste management units", or "Units") that is subject to the SWRCB–promulgated requirements of this division, pursuant to §§20080 and 20090 shall comply with the provisions of this article for purposes of detecting, characterizing, and responding to releases to ground water, surface water, or the unsaturated zone. Furthermore, §20400 of this article also applies to all determinations of alternative cleanup levels for unpermitted discharges to land of solid waste, pursuant to ¶III.G. of SWRCB Resolution No. 92–49 [§2550.4 of Title 23 of this code serves a similar function for unpermitted discharges to land of hazardous waste].

(b) Known or Reasonably Foreseeable Release—In accordance with applicable requirements of §§22220–22222, waste discharge requirements (WDRs) for a Unit subject to this section shall contain a provision which requires the discharger to obtain and maintain assurances of financial responsibility for initiating and completing corrective action for all known or reasonably foreseeable releases from the Unit.

(c) [Reserved]

(d) Apply Unless Clean–Closed—The regulations under this article apply during the Unit's active life and closure period. After closure of the Unit, the regulations in this article apply during the post–closure maintenance period of the Unit and during any compliance period under §20410 of this article, unless:

(1) the Unit has been in compliance with the water quality protection standard ("Water Standard" of §20390) for a period of three consecutive years; and

(2) Clean–Closure—all waste, waste residues, contaminated containment system components, contaminated subsoils, and all other contaminated materials are removed or decontaminated at closure, pursuant to: §21090(f), for landfills; §21400(b)(1), for surface impoundments; or §21410(a)(1), for waste piles.

(e) Allowable Engineered Alternatives—In considering a monitoring proposal by the discharger, the RWQCB can allow an engineered alternative for any of the prescriptive standards in this article so long as the RWQCB:

(1) finds that each engineered alternative meets the requirements of §20080(b & c);

(2) finds, for each applicable program under §20385, that the discharger's proposed monitoring–data procurement and analysis methods achieve the program's respective goals, including:

(A) for a detection monitoring program, the goals articulated in §20420(b);

(B) for an evaluation monitoring program, the goals articulated in §20425(a)(2); and

(C) for a corrective action program, the goals articulated in §20430(b);

(3) requires ground water monitoring at least annually at disposal Units and at Units that will be used for five or more years for waste treatment or storage.

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172 and 13267, Water Code; and Section 43103, Public Resources Code.

HISTORY

1. New subchapter 3, article 1 (sections 20380–20435) and section filed 6–18–97; operative 7–18–97 (Register 97, No. 25).

§ 20385. SWRCB — Required Programs. (C15: §2550.1)

(a) Monitoring Programs & their Respective Triggers—A discharger subject to this article shall conduct a monitoring and response program, approved by the RWQCB, for each Unit at the facility as follows.

(1) Detection Monitoring (default)—The discharger shall institute a detection monitoring program (under §20420) except as required below under ¶(a)(2–4):

(2) Evaluation Monitoring (trigger #1)—The discharger shall institute an evaluation monitoring program (under §20425) whenever there is "measurably significant" (see §20164) evidence of a release from the Unit during a detection monitoring program [under §20420(g or i)];

(3) Evaluation Monitoring (trigger #2)—The discharger shall institute an evaluation monitoring program (under §20425) whenever there is significant physical evidence of a release from the Unit. Significant physical evidence of a release includes unexplained volumetric changes in surface impoundments, unexplained stress in biological communities, unexplained changes in soil characteristics, visible signs of leachate migration, and unexplained water table mounding beneath or adjacent to the Unit and any other change to the environment that could reasonably be expected to be the result of a release from the Unit; and

(4) Corrective Action—The discharger shall institute a corrective action program under §20430 of this article when the RWQCB determines (pursuant to §20425) that the assessment of the nature and extent of the release and the design of a Corrective Action Program have been satisfactorily completed and the RWQCB approves the application for an amended report of waste discharge for corrective action submitted by the discharger during an evaluation monitoring program [pursuant to §20425(d)].

(b) Preparation for Other Programs—The RWQCB shall specify in the WDRs the specific type or types of monitoring programs required and the specific elements of each monitoring and response program. For each Unit, the RWQCB shall require one or more of the programs identified in ¶(a) that is appropriate for the prevailing state of containment at the Unit, and shall specify the circumstances under which each of the programs will be required. In deciding whether to require the discharger to be prepared to institute a particular program, the RWQCB shall consider the potential adverse effects on human health or the environment that might occur before final administrative action on an amended report of waste discharge to incorporate such a program could be taken.

(c) Concurrent Detection Monitoring Program, Where Necessary—In conjunction with an evaluation monitoring program or a corrective action program, the discharger shall continue to conduct a detection monitoring program as necessary to provide the best assurance of the detection of subsequent releases from the Unit.

NOTE: Authority cited: Section 1058, Water Code. Reference: Sections 13172, 13263, 13267 and 13304, Water Code; and Section 43103, Public Resources Code.